



U.S. Application 09/845,856

PATENT
Docket No. 2001B036

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Applicant:

Ajit B. Dandekar, et al.

Filed: April 30, 2001

Serial No.: 09/845,856

For: AROMATICS ALKYLATION

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Confirmation No.: 3184

Art Unit: 1764

Examiner: Thuan D. Dang

Docket No.: 2001B036

CERTIFICATE OF MAILING UNDER 37 CFR 1.8

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APPELLANTS' BRIEF UNDER 37 CFR 1.192(a)

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Commissioner of Patents

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Sir:

Appellants appeal to the honorable Board of Patent Appeals and Interferences the Primary Examiner's final rejection of the claims set forth in the Office Action of Examiner Dang mailed October 7, 2003.

As required, the Appeal Brief is being filed in triplicate.

1. Real Party in Interest

The real party in interest is ExxonMobil Chemical Company.

2. Related Appeals and Interferences

No appeals or interferences are known by Appellants, Appellants' legal representative, or assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims

Claims 1, 6 and 11-20 are before the Board for consideration.

4. Status of amendments

No amendments after final rejection have been filed.

5. Summary of the Invention

The present invention relates to a method for alkylating aromatics such as benzene with alkylating agents such as ethylene and propylene under alkylating conditions in the presence of an alkylation catalyst comprising phosphorus and a porous inorganic oxide material such as MCM-22, SH-3, SSZ-25, MCM-36, MCM-49 and MCM-56.

6. Issues

a. Did the Examiner err in rejecting claims 1, 6, 11, 12, 15, 16, and 18-20 under 35 U.S.C. § 102 (b) as being anticipated by U.S. Patent No. 5,536,894 to Degnan et al. (Degnan)?

b. Did the Examiner err in rejecting claims 13, 14, and 17 under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan et al. (Degnan)?

c. Did the Examiner err in rejecting claim 6 under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan et al. (Degnan) in view of U.S. Patent No. 5,557,024 to Cheng et al. (Cheng)?

7. Grouping of Claims

Claims 1, 11, 12, 15, 16, and 18-20 stand rejected under 35 U.S.C. § 102 (b) as being anticipated by U.S. Patent No. 5,536,894 to Degnan et al. (Degnan). Claims 1, 11, 12, 15, 16 and 18-20 stand or fall together.

Claims 13, 14, and 17 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan et al. (Degnan). Each of these claims stands or falls alone. Thus, claim 14 recites an amount of phosphorus between about 0.1 and about 0.5 wt.% phosphorus that is neither suggested nor disclosed by Degnan and hence stands or falls separately from the remaining claims that are not so limited as to the amount of phosphorus. Claim 17 recites MCM-22 that is neither suggested nor disclosed by Degnan and hence stands or falls separately from the remaining claims that are not so limited as to the porous crystalline material being MCM-22.

Claim 6 stands rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan et al. (Degnan) in view of U.S. Patent No. 5,557,024 to Cheng et al. (Cheng). Claim 6 stands or falls alone.

8. Arguments

A. Rejection under 35 U.S.C. § 102(b)

Claims 1, 11, 12, 15, 16, and 18-20 have been finally rejected under 35 U.S.C. 102 (b) as being anticipated by U.S. Patent No. 5,536,894 to Degnan et al. (Degnan). The Examiner argues that Degnan discloses a process for the alkylation of an aromatic such as benzene with ethylene or propylene in the presence of a catalyst containing MCM-56 and phosphorus (the Abstract; col. 10, lines 28-67; col. 14, lines

7-11). The Examiner further argues that Degnan discloses a catalyst containing 2.2 wt.% of phosphorus in Example 15. Degnan is also cited as disclosing the temperature of the process in column 10. Appellants respectfully disagree with the Examiner and request the Board to consider the following arguments.

The Degnan reference discloses MCM-56 as a sorbent and a catalyst component. Examples of catalytic use include acid catalyzed reactions, such as cracking, aromatic compound alkylation and isoalkane alkylation (see Abstract). However, the major emphasis of Degnan is catalytic cracking.

The Examiner wrongly relies on the Abstract; column 10, lines 26-67; and column 14, lines 7-11 of Degnan as teaching a process of alkylation in the presence of a catalyst containing MCM-56 and phosphorus. In fact, phosphorus is not mentioned in either the Abstract or in column 10, lines 26-67. Moreover, although column 14, lines 7-11 refers to “[t]he MCM-56 and/or large pore molecular sieve catalyst component may include phosphorus”, this is clearly referring back to the paragraph starting in column 13, line 39 which reads “In the FCC process, the MCM-56 component may be combined with a large-pore molecular sieve component.” In other words, the passage in column 14, lines 7-11 is specific to use of the MCM-56 as a cracking catalyst and not as an alkylation catalyst.

Use of MCM-56 as an aromatics alkylation catalyst actually only appears three times in the Degnan disclosure, first in the Abstract, again at column 10, lines 28 through 60, and finally in claims 8 through 11. None of these instances describe the MCM-56 as being used with phosphorus. Phosphorus is mentioned several times in the application, first in column 4, lines 19 through 31; second in column 14, lines 7 through 11; in Example 15 and the text at column 24, lines 64 to 66; as well as in claims 26 and 32. *All mention of phosphorus by Degnan is made in the context of catalytic cracking catalysts*, a known use of phosphorus. *No mention of phosphorus is made in the context of aromatics alkylation.*

The Examiner does not contest appellant's argument that all mention of phosphorus by Degnan is made in the context of catalytic cracking catalysts, but rejects the argument as unpersuasive on the ground that "Degnan discloses the catalyst is used of alkylation of aromatic hydrocarbon (column 10)". However, the passages in column 10 that refer to the use of MCM-56 as an alkylation catalyst make no reference to the presence of phosphorus. Thus the Examiner is picking one part of the Degnan reference (column 10 or the Abstract) that refers to the use of MCM-56 as an alkylation catalyst and combining this with an unrelated part of the Degnan reference (column 14) that refers to the addition of phosphorus to a cracking catalyst containing MCM-56. It is respectfully submitted that this selective picking and choosing from different parts of a reference is error.

It is well understood that the teaching of a reference *as a whole* should be considered. Even in the context of a rejection under 35 U.S.C. § 103, the court has held that it is impermissible "to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Wesslau*, 353 F.2d 238, 147 USPQ 391 (CCPA 1965). In addition, the court has held that "For a prior art reference to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference...These elements must be arranged as in the claim under review". *In re Bond*, 910 F.2d 831, 832, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990).

It is respectfully submitted that the Degnan reference does not disclose the elements of the present claim 1 arranged as in the claim since Degnan does not disclose or suggest that, when used as in an aromatics alkylation process rather than a catalytic cracking process, MCM-56 should contain phosphorus.

With regard to the catalyst of Example 15 of Degnan, the Examiner does not contest appellant's argument that the catalyst in this Example was prepared for use in catalytic cracking but finds the argument unpersuasive since "on column 14, lines 7-11, Degnan discloses the MCM-56 containing phosphorus" and "(i)n the abstract, Degnan discloses MCM-56 catalyst is an aromatic alkylation catalyst." Again, however, the Examiner is selectively picking a teaching that an MCM-56 cracking catalyst can incorporate phosphorus and then applying this teaching to a totally unrelated portion of the Degnan disclosure, namely that MCM-56 can be used as an alkylation catalyst.

In conclusion, therefore, it is respectfully submitted that there is no disclosure in Degnan of all the elements of appellants' claims, namely of an alkylation process which employs both MCM-56 and phosphorus. It is therefore submitted that there can be no anticipation of claims 1, 11, 12, 15, 16, and 18-20 under 35 U.S.C. § 102 (b) by Degnan. Accordingly, reversal of the Examiner's final rejection by the honorable Board is respectfully requested.

B. Rejections Under 35 U.S.C. § 103 (a)

(i) Claims 13, 14, and 17 have been finally rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan et al. (Degnan). The Examiner argues that Degnan is silent as to the content of phosphorus in the catalyst in claims 13 and 14 but contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Degnan process by selecting the appropriate amount of phosphorus. The Examiner admits that Degnan does not disclose using MCM-22 as in claim 17 but argues that Degnan discloses that MCM-22 has similar characteristics with MCM-56. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the process of Degnan by using MCM-22 in place of MCM-56. Appellants respectfully disagree with the Examiner and request the Board to consider the following arguments.

As previously stated the only disclosure in Degnan relating to the use of phosphorus with MCM-56 is in relation to the use of the MCM-56 as a cracking catalyst. In particular, in column 14, lines 7 through 11, Degnan states that phosphorus may be added for "any of the functions generally attributed thereto, such as, for example, attrition resistance, stability, metals passivation, and coke make reduction." In contrast, the present invention is based on the discovery that when phosphorus is added to specific porous crystalline materials, such as MCM-56, used in the alkylation of aromatic compounds the activity of the catalyst, its selectivity to monoalkylated products and its hydrothermal stability during regeneration are increased. This is apparent from the Examples in the instant specification and in particular Tables 2 to 4.

There is no indication anywhere in Degnan that phosphorus would be beneficial to the use of MCM-56 in aromatics alkylation and in particular that phosphorus would increase the activity of the catalyst and its selectivity to monoalkylated products. It is therefore respectfully submitted that it would not have been obvious in view of Degnan to one of ordinary skill in the art at the time the invention was made to employ phosphorus-containing MCM-56 in an aromatics alkylation process as claimed in the present application.

Instant claim 13 recites an alkylation catalyst containing between about 0.1 and about 2 wt.% phosphorus. Instant claim 14 recites an alkylation catalyst containing between about 0.1 and about 0.5 wt.% phosphorus. In Example 16 of Degnan, 25 wt% of an MCM-56 catalyst containing 2.2 wt% of phosphorus is mixed with 75 wt% of a REUSY catalyst and the resultant catalyst is used in Example 19 to crack a heavy gas oil. There is no indication anywhere in Degnan that phosphorus would be beneficial to the use of MCM-56 in aromatics alkylation. Therefore, it would not have been obvious to one of ordinary skill in the art at the time the

invention was made to optimize the wt.% phosphorus in a phosphorus-containing MCM-56 catalyst for alkylation.

With regard to claim 17, the invention of Degnan is clearly directed to the use of MCM-56. Moreover, although Degnan indicates in column 5, lines 6 and 7 that there are similarities between MCM-56 and MCM-22, in lines 21 and 22 of column 5 Degnan also states that “MCM-56 exhibits unique sorption and catalytic utilities when compared to MCM-22 and MCM-49”. It would not have been obvious to one of ordinary skill in the art at the time the invention was made to employ phosphorus-containing MCM-22 in aromatics alkylation, as recited in instant claim 17, in light of the disclosure of Degnan.

Accordingly, it is respectfully submitted that Degnan fails to disclose or fairly suggest in any way the present invention as recited in claims 13, 14, and 17. In view of this, reversal of the Examiner’s final rejection by the honorable Board of claims 13, 14, and 17 under 35 U.S.C. § 103 (a) is respectfully requested.

(ii) Claim 6 has been finally rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 5,536,894 to Degnan et al. (Degnan) in view of U.S. Patent No. 5,557,024 to Cheng et al. (Cheng). The Examiner admits Degnan is silent as to the phase of alkylation, but argues that Cheng discloses that alkylation using an MCM-56 catalyst can be operated in gas or liquid phase. The Examiner concludes it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Degnan process by operating a liquid phase alkylation process to arrive at Appellants' process because it is expected that alkylation processes operated in the liquid or gas phase yield similar results. Appellants respectfully disagree with the Examiner and request the Board to consider the following arguments.

The combination of Degnan with Cheng does not make the present invention obvious because this combination does not disclose or suggest the *use of phosphorus with catalysts in alkylation processes* under alkylation conditions, in any phase. There is no indication in Degnan that phosphorus would be beneficial to the use of MCM-56 in aromatics alkylation in either the liquid or gas phase. Likewise, there is no disclosure in Cheng that phosphorus would be beneficial to the use of MCM-56 in aromatics alkylation in either the liquid or gas phase. The combination of Degnan and Cheng fails to disclose or suggest to one skilled in the art liquid phase alkylation using a catalyst comprising phosphorus and MCM-56, as recited in claim 6.


Accordingly, it is respectfully submitted that Degnan in view of Cheng fails to disclose or fairly suggest in any way the present invention as recited in claim 6. In view of this, reversal of the Examiner's final rejection by the honorable Board of claim 6 under 35 U.S.C. § 103 (a) is respectfully requested.

9. Conclusion

Appellants respectfully submit that the foregoing arguments obviate all of the Examiner's final rejections in this case. The cited references neither disclose nor suggest the phosphorus-containing alkylation catalyst of the present invention. In view of this, reversal of these rejections by the Board is respectfully requested.

Respectfully submitted,

Date 5/7/04



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APPENDIX

CLAIMS:

1. A process for producing a monoalkylaromatic compound comprising the step of contacting an alkylatable alkylaromatic compound with an alkylating agent under alkylation conditions in the presence of an alkylation catalyst comprising phosphorus and a porous crystalline inorganic oxide material having an X-ray diffraction pattern including the d-spacing maxima at 12.4 ± 0.25 , 6.9 ± 0.15 , 3.57 ± 0.07 and 3.42 ± 0.07 Angstrom, said conditions being sufficient to produce said monoalkylaromatic compound.
6. The process of claim 1, wherein the alkylation conditions are such as to maintain the alkylatable aromatic compound substantially in the liquid phase.
11. The process of claim 1, wherein the porous crystalline inorganic oxide material is selected from the group consisting of MCM-22, PSH-3, SSZ-25, MCM-36, MCM-49 and MCM-56.
12. The process of claim 1, wherein the alkylation catalyst contains between about 0.05 and about 10 wt.% phosphorus, as measured on an elemental basis, based on the weight of the final catalyst.
13. The process of claim 1, wherein the alkylation catalyst contains between about 0.1 and about 2 wt.% phosphorus, as measured on an elemental basis, based on the weight of the final catalyst.
14. The process of claim 1, wherein the alkylation catalyst contains between about 0.1 and about 0.5 wt % phosphorus, as measured on an elemental basis, based on the weight of the final catalyst.

15. The process of claim 1, wherein the alkylating agent includes an aliphatic group having 1 to 5 carbon atoms.
16. The process of claim 1, wherein the aromatic hydrocarbon is benzene and the alkylating agent is selected from ethylene and propylene.
17. The process of claim 1, wherein the aromatic hydrocarbon is benzene, the alkylating agent is ethylene and the alkylation catalyst includes phosphorus and MCM-22.
18. The process of claim 1, wherein the aromatic hydrocarbon is benzene, the alkylating agent is propylene and the alkylation catalyst includes phosphorus and MCM-49 or MCM-56.
19. The process of claim 1, wherein the alkylation conditions comprise a temperature less than 500°C.
20. The process of claim 1, wherein the alkylation conditions comprise a temperature less than 250°C.

TABLE OF CASES

1. *In re Wesslau*, 353 F.2d 238, 147 USPQ 391 (CCPA 1965)
2. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).